



327017

**SAMPLING AND ANALYSIS PLAN  
FOR THE  
LANE ST. GROUNDWATER SITE  
ELKHART, ELKHART COUNTY, INDIANA**

Prepared for  
**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
Region V

Prepared by  
**WESTON SOLUTIONS, INC.**  
Region V Superfund Technical Assessment and Response Team

December 13, 2007

Approved by:

Ken Theisen, U.S. EPA Region V  
On-Scene Coordinator

Date:

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## ACRONYM LIST

<b>µg/L</b>	micrograms per liter
<b>ATSDR</b>	Agency for Toxic Substances and Disease Registry
<b>COC</b>	Chain-of-Custody
<b>ERT</b>	Environmental Response Team
<b>Hg</b>	Mercury
<b>IDEM</b>	Indiana Department of Environmental Management
<b>MCL</b>	Maximum contaminant level
<b>MS/MSD</b>	Matrix Spike/ Matrix Spike Duplicate
<b>OSC</b>	On-Scene Coordinator
<b>PCE</b>	Tetrachloroethylene
<b>ppb</b>	Part Per Billion
<b>POE</b>	Point of entry
<b>POU</b>	Point of use
<b>PPE</b>	Personal Protective Equipment
<b>PRP</b>	Potentially Responsible Party
<b>QAPP</b>	Quality Assurance Project Plan
<b>QA/QC</b>	Quality Assurance/Quality Control
<b>RAL</b>	Removal Action Level
<b>SAP</b>	Sampling and Analysis Plan
<b>SOP</b>	Standard Operating Procedure
<b>START</b>	Superfund Technical Assessment and Response Team
<b>SVOC</b>	Semivolatile Organic Compound
<b>TCE</b>	Trichloroethylene
<b>U.S. EPA</b>	United States Environmental Protection Agency
<b>VC</b>	Vinyl Chloride
<b>VOC</b>	Volatile Organic Compound
<b>VRP</b>	Voluntary Remediation Program
<b>IDEM</b>	Indiana Department of Environmental Management
<b>WESTON</b>	Weston Solutions, Inc.

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## 1.0 Introduction

This Sampling and Analysis Plan (SAP) identifies the data collection activities and associated quality assurance/quality control (QA/QC) measures specific to the Lane Street Groundwater Site (the Site) located in Elkhart, Elkhart County, Indiana. All data will be generated in accordance with the quality requirements described in the *START III Generic QAPP*, dated June 2006. The purpose of this SAP is to describe site-specific tasks that will be performed in support of the stated objectives. The SAP will reference the QAPP for generic tasks common to all data collection activities including routine procedures for sampling and analysis, sample documentation, equipment decontamination, sample handling, data management, assessment, and data review. Additional site-specific procedures and/or modifications to procedures described in the *START III Generic QAPP* are described in the following SAP elements.

This SAP is prepared, reviewed, and approved in accordance with the procedures detailed in the *START III Generic QAPP*. Any deviations or modifications to the approved SAP will be documented using **Table 1: SAP Revision Form**.

## 2.0 Project Management and SAP Distribution and Project Team Member List

Management of the Site will be as documented in the *START III Generic QAPP*. Refer to the *START III Generic QAPP* for an organizational chart, communication pathways, personnel responsibilities and qualifications, and special personnel training requirements.

The following personnel will be involved in planning and/or technical activities performed for this data collection activity. Each will receive a copy of the approved SAP. A copy of the SAP will also be retained in the site file.

Personnel	Title	Organization	Phone Number	Email
Ken Theisen	OSC	U.S. EPA	312-886-1959	theisen.kenneth@epamail.epa.gov
Sarah Meyer	Project Manager	START	312-424-3303	s.meyer@westonsolutions.com
Jay Rauh	Site Leader	START	312-424-3315	jay.rauh@westonsolutions.com
Tonya Balla	Health and Safety	START	847-918-4094	t.balla@westonsolutions.com
Pamela Bayles	QA Reviewer	START	847-918-4030	pamela.bayles@westonsolutions.com

NOTES:

OSC – On-Scene Coordinator

QA – Quality Assurance

START – Superfund Technical Assessment and Response Team

U.S. EPA – United States Environmental Protection Agency

### **3.0 Planning and Problem Definition**

#### **3.1 Problem Definition**

The GeoCel facility, which is the source of a contaminated groundwater plume located near the Site, was entered into the Voluntary Remediation Program (VRP) under the direction of Indiana Department of Environmental Management (IDEM). The groundwater at the GeoCel VRP Site is contaminated with vinyl chloride, a late-stage degradation product of tetrachloroethene (PCE), the original contaminant .

A local resident who lives on Lane Street in Elkhart, Indiana, noticed media coverage of the GeoCel VRP Site and performed testing of their own residential well (groundwater) water. The resident notified IDEM when test results indicated that their well was contaminated with trichloroethylene (TCE). In light of these results, IDEM subsequently sampled numerous residential wells along Lane Street. IDEM discovered TCE in residential wells in the area at levels up to 300 parts per billion (ppb).

Analytical results from both sites, the GeoCel VRP Site and the Lane Street Groundwater Site, strongly suggest that the contamination at the Lane Street Groundwater Site is more recent and from a different source than the contamination in the GeoCel VRP Site. TCE is also a degradation product of PCE. In the degradation process, PCE degrades to TCE, which can eventually degrade to vinyl chloride. There has been very little, if any, TCE detected in the GeoCel VRP Site plume. This indicates that any TCE that was generated from the breakdown of the original PCE contaminant has already degraded in the GeoCel VRP Site plume and the contamination at this time is predominantly vinyl chloride. The Lane Street Groundwater Site contamination is primarily TCE; no vinyl chloride has been detected. This indicates that TCE or a more recent release of PCE is the source of contamination at the Lane Street Groundwater Site.

At the request of IDEM, U.S. EPA confirmed the groundwater sampling results by sampling the residential wells of several homes along Lane Street in September 2007. Since the presence of TCE has been confirmed in groundwater at the Site, U.S. EPA has chosen to sample indoor air at two homes for the presence of volatile organic compounds (VOC) that may have migrated into the homes from the groundwater.

#### **3.2 Site History and Background**

The Site is located along the east and west sides of Lane Street in Elkhart, Elkhart County, Indiana. The Site is bordered on the north by mixed industrial facilities, to the east by other residences including the area affected by the GeoCel VRP Site, to the west by open land, and to the south by residences. The Meridian coordinates for the site are 41.716745 ° and -85.920974 °.

As a result of news reports documenting the GeoCel VRP Site cleanup in Elkhart, Indiana, a local

resident who lives on Lane Street was concerned and had their residential well water tested by a private laboratory. The test results indicated that the well water contained concentrations of TCE that exceed the Maximum Contaminant Level (MCL) for the National Primary Drinking Water Standard (5 micro grams per liter [ $\mu\text{g/L}$ ]). The resident notified IDEM of the test results and IDEM launched an investigation into the extent of the groundwater contamination in the area.

On August 30 and 31, 2007, IDEM tested the resident's well and discovered contamination, but at significantly lower concentrations than the resident reported. IDEM then tested numerous private water supplies along Lane Street. In order to validate IDEM's analytical results from the August sampling event, a request was sent to the U.S. EPA to re-sample a random number of the wells along Lane Street for the same analytical parameters at a date soon after the initial sampling.

On September 5, 2007, U.S. EPA and WESTON START collected residential well samples from homes on Lane Street. Results from this sampling event confirmed the IDEM sampling results.

Based on the U.S. EPA sampling results, OSC Ken Theisen authorized the installation of carbon filtration water treatment systems for the affected residents, including one year of maintenance. The installation effort included:

- Point of Entry (POE) water treatment systems for nine residences where TCE was detected in the well water;
- POE water treatment systems for two residences located next to residences with TCE in their well water;
- Point of Use (POU) water treatment systems for two residences located two houses away from residences with TCE in their well water.

Since the presence of TCE has been confirmed in groundwater at the Site, and to ensure the homeowners' safety, U.S. EPA has chosen to sample indoor air at two homes for the presence of TCE and VOCs. Cracks in the foundation slabs, sump and drainage piping, or other conduits can act to convey contaminant vapor that has volatilized from groundwater into the homes. At the direction of the OSC, two residences with elevated TCE concentrations in their well water were selected for the sampling event; the residences at 53514 Lane Street (96  $\mu\text{g/L}$  TCE in the water supply) and 53532 Lane Street (260  $\mu\text{g/L}$  TCE in the water supply).

### **3.3 Contaminants of Concern/Target Analytes**

The primary contaminants of concern are TCE and other VOCs. All samples will be analyzed for VOCs.

## **4.0 Project Description and Schedule**

The sampling event will consist of sampling two residences for concentrations of VOCs in indoor air with SUMMA canister negative pressure samplers and regulators that will allow for collection of 24-hour samples. START will have one team member performing the sampling and sample management for shipment. Section 6 contains a more detailed sampling design.

The laboratory that will perform the analysis is STAT Analysis Corp. The laboratory was selected by using a competitive bid process. A minimum of two bids were evaluated before the laboratory was selected. The laboratory is qualified to perform the requested analysis. Sample labels and chain-of-custody (COC) paperwork will be generated by WESTON START using standard methods. Samples will be packaged properly by WESTON START and shipped or delivered to the laboratory.

The turnaround time for receiving the sample analytical data will be two weeks and three weeks for receipt of the full data package with QC information. The sampling results will be reviewed and validated by WESTON. A summary report of the sampling results will be submitted to U.S. EPA upon completion of the data validation process.

U.S. EPA and WESTON START will perform the sampling over a 24-hour period from approximately noon, Thursday, December 13, 2007 to noon, Friday, December 14, 2007.

## **5.0 Project Quality Objectives**

### **5.1 Project Objectives**

The objective of sampling will be to determine if there is any VOC contamination in indoor air related to the TCE contamination in the well water at the residences of Lane Street. More information about the sampling procedures to support this is provided in Section 6.

### **5.2 Measurement and Performance Criteria**

Generic measurement and performance criteria described in the *START III Generic QAPP* will be used. These criteria will ensure that data are sufficiently sensitive, precise, accurate, and representative to support site decisions.

### **5.3 Data Quality Objectives**

Data quality objectives address requirements that include when, where, and how to collect samples; the number of samples; and the limits on tolerable error rates. These steps will be periodically revisited as new information about a problem is learned.

U.S. EPA has selected residences with wells that were tested and found to have elevated levels of TCE for the sampling. All indoor air samples are to be analyzed for VOCs. The results will be compared to unique criteria under development by the Agency for Toxic Substances and Disease Registry (ATSDR) and U. S. EPA (Attachment A). Detections will be noted and may be used to



initiate further removal or remedial action by U.S. EPA. In addition, IDEM will use the data and compare results to MCLs, State of Indiana public health indoor air quality standards (Title 327 Indiana Administrative Code), and any advisories found in IAC Article 13 Indiana Code.

## 6.0 Sampling Design

Two residences will be sampled. The residential indoor air sampling procedures are outlined below. Note that all home owners have been notified about the scheduled sampling. The U.S. EPA OSC will be present during the sampling and will advise the homeowners concerning the sampling and address any questions. The following procedure will be followed in the order as shown for collecting samples.

1. Locate sampling point within the home. The sampling location should be in the basement, or on slab level, and close to any conduits that could carry vaporized contamination from the groundwater to the home (e.g. sump, piping, slab cracks, etc). The sampling location should also be away from any other potential VOC sources. The sampler will document potential sources of TCE and VOC contamination in the residence, including recently dry-cleaned clothes, use of cleaning solvents, and nearby chemical storage.
2. Prior to sample collection, complete the appropriate information in Attachment B, the Air Sampling Data Sheet.
3. WESTON START and the OSC will provide the homeowner with instructions not to disturb the sampler, or create an atmosphere containing VOCs around the sampler (e.g. use cleaning products), for the duration of the sampling period.
3. Open a canister, which is evacuated to 28 to 30 inches mercury (Hg) at sea level and fitted with a flow restricting device, to the atmosphere containing the VOCs to be sampled. The pressure differential causes the sample to flow into the canister.
4. Verify that the regulator is properly regulating the flow of the sample into the canister one hour after the sample is begun and one hour before it is complete. Check the pressure on the regulator gauge at this time and record on air sampling data sheet.
5. Sampling duration depends on the degree to which the flow is restricted. The flow will remain constant until the vacuum reads approximately 11 inches Hg. When this occurs, control the flow, either manually or automatically, to achieve constant flow.
6. After sampling is complete, record the appropriate information in Attachment B, the Air Sampling Data Sheet.
7. Record all information on the residential sampling form or in the site logbook. Data recorded must include sampling location within the house, background VOC readings (using a ppbRAE), site observations, indoor and outdoor temperature, sampling date, and sampling time.
8. Label all samples immediately at the collection site with sample name, date, and time. The

sample management person will be responsible for affixing appropriate labels to the sample containers.

All samples will be analyzed for VOCs by U.S. EPA Method TO-15. Requirements for the sample container, volume, preservation, and QC samples are presented in Table 2: Sampling and Analysis Summary.

## **6.1 Sample Numbering System**

All samples for analysis, including QC samples, will be given a unique sample number. The sample numbers will be recorded in the Air Sampling Data Sheet (Attachment B) or field logbook, the COC paperwork, and the shipment documents.

WESTON START will assign each sample its unique number. The sample number highlights the suspected contaminated area and location, and will be used for documentation purposes in field logbooks, as well as for presentation of the analytical data in memoranda and reports. The project samples will be identified using the following format:

### **LS-IA-XXXXX-mmdyy**

LS indicates that the sample is taken for the Lane Street Groundwater Site.

IA indicates that the sample matrix is Indoor Air.

XXXX is the numerical address on Lane Street where the sample is collected.

mmdyy will record the sampling date.

An example of a sample identification for the Site follows:

- LS-IA-53532-121407: Lane Street, Indoor air, street address 53532, collected on December 14, 2007

## **6.2 Management of Investigation-Derived Wastes**

For purposes of this SAP, investigation-derived wastes are defined as any byproduct of the field activities that is suspected or known to be contaminated with hazardous substances. The SUMMA canisters will be cleaned and re-certified by the laboratory following their use..

## **7.0 Sampling Procedures**

### **7.1 Sampling Standard Operating Procedures**

The following WESTON standard operating procedure (SOP) will be used with some modification as directed by U.S. EPA (procedures set forth in Section 6.0 are those to be followed):

- SOP 806 – SUMMA CANISTER SAMPLING

The following U.S. EPA Environmental Response Team (ERT) SOP will also be use as a reference:

- SOP 1704 – SUMMA CANISTER SAMPLING

Both SOPs are provided in Attachment C.

### **7.2 Decontamination Procedures**

General decontamination procedures are described in Section B.2 of the *START III Generic QAPP*. All disposable sampling supplies and PPE will be bagged and disposed of as general refuse with U.S. EPA approval.

## **8.0 Sample Handling, Tracking, and Custody Procedures**

All samples will be identified, handled, shipped, tracked, and maintained under COC, in accordance with the *U.S. EPA Contract Laboratory Program Guidance for Field Samples* dated August 2004.

## **9.0 Field Analytical Methods and Procedures**

### **9.1 Field Analytical Methods and Standard Operating Procedures**

WESTON START will use ppbRAE VOC air monitoring device to screen for detectable VOCs in the homes and determine background VOC levels prior to beginning sample collection. All ppbRAE information will be recorded in the field logbook.

### **9.2 Field Testing Laboratory**

A field testing laboratory will not be used during the site assessment.

### **9.3 Screening/Confirmatory Analyses**

Screening/Confirmatory Analyses will not be used during the sampling event.

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## **10.0 Fixed Laboratory Analytical Methods and Procedures**

The laboratory for the analyses is:

STAT Analysis Corporation  
2242 W Harrison Street, Suite 200  
Chicago, Illinois 60612  
(312) 733-0551

## **11.0 Quality Control Activities**

### **11.1 Field Quality Control**

The number of QC samples collected for each analytical parameter are listed in **Table 2: Sampling and Analysis Summary**. The QC sample determination and frequency is in accordance with the *START III Generic QAPP*, Table 4.

### **11.2 Analytical Quality Control**

QC for analytical procedures will be performed at the frequency described in the *START III Generic QAPP*, Tables 5 and 6. In addition, method-specific QC requirements will be used to ensure data quality.

### **11.3 Performance Evaluation Samples**

Performance evaluation samples will not be collected during this sampling event.

## **12.0 Documentation, Records, and Data Management**

Documentation, record keeping, and data management activities will be conducted in accordance with the *START III Generic QAPP*, Section B.10.

## **13.0 Quality Assurance Assessment and Corrective Actions**

No field audits will be conducted due to the short-term (one day) duration of the sampling event.

## **14.0 Reports to Management**

Reports to management will be written and distributed in accordance with the *START III Generic*

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*QAPP*, Section C.

## **15.0 Steps 1, 2 and 3: Data Review Requirements and Procedures**

Step 1: Data collection activities, including sample collection and data generation, will be verified in accordance with the *START III Generic QAPP*, Section D.

Step 2: Data will be validated by WESTON.

Step 3: Data will be reviewed for usability in accordance with the *START III Generic QAPP*, Section D.

**Table 1**  
**SAP Revision Form**

**Site:** Lane Street Groundwater Site, Elkhart, Elkhart County, Indiana

**OSC:** Ken Theisen

**TDD:** S05-0002-0708-025

Date	Revision Number	Proposed Change to SAP/QAPP	Reason for Change of Scope/Procedures	SAP Section Superseded	Requested By	Approved By

**Table 2**  
**Sampling and Analysis Summary**

**Site:** Lane Street Groundwater Site, Elkhart, Elkhart County, Indiana

**OSC:** Ken Theisen

**TDD:** S05-0002-0708-025

Matrix	Analytical Parameter	Analytical Method	Containers (Numbers, Size, and Type)	Preservation Requirements	Number of Sampling Locations	Number of Field Duplicates	Number of MS/MSDs <sup>2</sup>	Number of VOA Trip Blanks <sup>1</sup>	Number of Equip./Rinsate Blanks	Total Number of Samples to Lab <sup>3</sup>
Air	VOCs	U.S. EPA T0-15	Two clean 6-liter SUMMA canisters with 24-hour flow controllers	None; keep cool	2	0	0	0	0	2

Notes:

<sup>1</sup> Trip blanks are only required for VOCs in water samples.

<sup>2</sup> For the samples designated for MS/MSDs, triple volume is required for VOCs and SVOCs and double volume for metals.

<sup>3</sup> Total number of samples to the laboratory does not include MS/MSD samples.

Equip. – Equipment

GC/MS – Gas chromatography-mass spectrometry

MS/MSD – Matrix Spike/Matrix Spike Duplicate

U.S. EPA – United States Environmental Protection Agency

VOA – volatile organic analysis

VOC – volatile organic compound

**ATTACHMENT A**

**U.S. EPA/ATSDR ACTION LEVELS (SITE SPECIFIC)  
(UNDER DEVELOPMENT)**



**ATTACHMENT B**  
**AIR SAMPLING DATA SHEET**

**ATTACHMENT C**  
**ERT SUMMA CANISTER SAMPLING SOP**  
**AND**  
**WESTON SUMMA CANISTER SAMPLING SOP**



## SUMMA CANISTER SAMPLING

SOP#: 1704  
DATE: 07/27/95  
REV. #: 0.1

### 1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to describe a procedure for sampling of volatile organic compounds (VOCs) in ambient air. The method is based on samples collected as whole air samples in Summa passivated stainless steel canisters. The VOCs are subsequently separated by gas chromatography (GC) and measured by mass-selective detector or multidetector techniques. This method presents procedures for sampling into canisters at final pressures both above and below atmospheric pressure (respectively referred to as pressurized and subatmospheric pressure sampling).

This method is applicable to specific VOCs that have been tested and determined to be stable when stored in pressurized and subatmospheric pressure canisters. The organic compounds that have been successfully collected in pressurized canisters by this method are listed in the Volatile Organic Compound Data Sheet (Appendix A). These compounds have been measured at the parts per billion by volume (ppbv) level.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent on site conditions, equipment limitations or limitations imposed by the procedure or other procedure limitations. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. EPA endorsement or recommendation for use.

### 2.0 METHOD SUMMARY

Both subatmospheric pressure and pressurized sampling modes use an initially evacuated canister. Both modes may also use a mass flow controller/vacuum pump arrangement to regulate flow. With the above configuration, a sample of ambient air

is drawn through a sampling train comprised of components that regulate the rate and duration of sampling into a pre-evacuated Summa passivated canister. Alternatively, subatmospheric pressure sampling may be performed using a fixed orifice, capillary, or adjustable micrometering valve in lieu of the mass flow controller/vacuum pump arrangement for taking grab samples or short duration time-integrated samples. Usually, the alternative types of flow controllers are appropriate only in situations where screening samples are taken to assess for future sampling activities.

### 3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

After the air sample is collected, the canister valve is closed, an identification tag is attached to the canister, and the canister is transported to a laboratory for analysis. Upon receipt at the laboratory, the canister tag data is recorded. Sample holding times and expiration should be determined prior to initiating field activities.

### 4.0 INTERFERENCES AND POTENTIAL PROBLEMS

Contamination may occur in the sampling system if canisters are not properly cleaned before use. Additionally, all other sampling equipment (e.g., pump and flow controllers) should be thoroughly cleaned.

### 5.0 EQUIPMENT/APPARATUS

The following equipment/apparatus (Figure 1, Appendix B) is required:

## **5.1 Subatmospheric Pressure Sampling Equipment**

1. VOC canister sampler - whole air sampler capable of filling an initially evacuated canister by action of the flow controlled pump from vacuum to near atmospheric pressure. (Andersen Samplers Inc., Model 87-100 or equivalent).
2. Sampling inlet line - stainless steel tubing to connect the sampler to the sample inlet.
3. Sample canister - leak-free stainless steel pressure vessels of desired volume with valve and Summa passivated interior surfaces (Scientific Instrumentation Specialist, Inc., ID 83843, Andersen Samplers, Inc., or equivalent).
4. Particulate matter filter - 2- $\mu$ m sintered stainless steel in-line filter (Nupro Co., Model SS-2F-K4-2, or equivalent).
5. Chromatographic grade stainless steel tubing and fittings - for interconnections (Alltech Associates, Cat. #8125, or equivalent). All materials in contact with sample, analyte, and support gases should be chromatographic grade stainless steel.
6. Fixed orifice, capillary, or adjustable micrometering valve - used in lieu of the electronic flow controller/vacuum pump for grab samples or short duration time-integrated samples.

## **5.2 Pressurized Sampling Equipment**

1. VOC canister sampler - whole air sampler capable of filling an initially evacuated canister by action of the flow controlled pump from vacuum to near atmospheric pressure. (Andersen Samplers Inc., Model 87-100).
2. Sampling inlet line - stainless steel tubing to connect the sampler to the sample inlet.
3. Sample canister - leak-free stainless steel pressure vessels of desired volume with valve and Summa passivated interior

surfaces (Scientific Instrumentation Specialist, Inc., ID 83843, Andersen Samplers, Inc., or equivalent).

4. Particulate matter filter - 2- $\mu$ m sintered stainless steel in-line filter (Nupro Co., Model SS-2F-K4-2, or equivalent).
5. Chromatographic grade stainless steel tubing and fittings - for interconnections (Alltech Associates, Cat. #8125, or equivalent). All materials in contact with sample, analyte, and support gases should be chromatographic grade stainless steel.

## **6.0 REAGENTS**

This section is not applicable to this SOP.

## **7.0 PROCEDURE**

### **7.1 Subatmospheric Pressure Sampling**

#### **7.1.1 Sampling Using a Fixed Orifice, Capillary, or Adjustable Micrometering Valve**

1. Prior to sample collection, the appropriate information is completed on the Canister Sampling Field Data Sheet (Appendix C).
2. A canister, which is evacuated to 0.05 mm Hg and fitted with a flow restricting device, is opened to the atmosphere containing the VOCs to be sampled.
3. The pressure differential causes the sample to flow into the canister.
4. This technique may be used to collect grab samples (duration of 10 to 30 seconds) or time-integrated samples (duration of 12 to 24 hours). The sampling duration depends on the degree to which the flow is restricted.
5. A critical orifice flow restrictor will have a decrease in the flow rate as the pressure approaches atmospheric.
6. Upon sample completion at the location, the appropriate information is recorded on the

## Canister Sampling Field Data Sheet.

### 7.1.2 Sampling Using a Mass Flow Controller/Vacuum Pump Arrangement (Andersen Sampler Model 87-100)

1. Prior to sample collection the appropriate information is completed on the Canister Sampling Field Data Sheet (Appendix C).
2. A canister, which is evacuated to 0.05 mm Hg and connected in line with the sampler, is opened to the atmosphere containing the VOCs to be sampled.
3. A whole air sample is drawn into the system through a stainless steel inlet tube by a direct drive blower motor assembly.
4. A small portion of this whole air sample is pulled from the inlet tube by a specially modified inert vacuum pump in conjunction with a mass flow controller.
5. The initially evacuated canister is filled by action of the flow controlled pump to near atmospheric pressure.
6. A digital time-program is used to pre-select sample duration and start and stop times.
7. Upon sample completion at the location, the appropriate information is recorded on the Canister Sampling Field Data Sheet.

## 7.2 Pressurized Sampling

### 7.2.1 Sampling Using a Mass Flow Controller/Vacuum Pump Arrangement (Anderson Sampler Model 87-100)

1. Prior to sample commencement at the location, the appropriate information is completed on the Canister Sampling Field Data Sheet.
2. A canister, which is evacuated to 0.05 mm Hg and connected in line with the sampler, is opened to the atmosphere containing the

VOCs to be sampled.

3. A whole air sample is drawn into the system through a stainless steel inlet tube by a direct drive blower motor assembly.
4. A small portion of this whole air sample is pulled from the inlet tube by a specially modified inert vacuum pump in conjunction with a mass flow controller.
5. The initially evacuated canister is filled by action of the flow controlled pump to a positive pressure not to exceed 25 psig.
6. A digital time-programmer is used to pre-select sample duration and start and stop times.
7. Upon sample completion at the location, the appropriate information is recorded on the Canister Sampling Field Data Sheet.

## 8.0 CALCULATIONS

1. A flow control device is chosen to maintain a constant flow into the canister over the desired sample period. This flow rate is determined so the canister is filled to about 88.1 kPa for subatmospheric pressure sampling or to about one atmosphere above ambient pressure for pressurized sampling over the desired sample period. The flow rate can be calculated by:

$$F = \frac{(P)(V)}{(T)(60)}$$

where:

F	=	flow rate (cm <sup>3</sup> /min)
P	=	final canister pressure, atmospheres absolute
V	=	volume of the canister (cm <sup>3</sup> )
T	=	sample period (hours)

For example, if a 6-L canister is to be filled to 202 kPa (two atmospheres) absolute pressure in 24 hours, the flow rate can be calculated by:

$$F = \frac{(2)(6000)}{(24)(60)} = 8.3 \text{ cm}^3/\text{min}$$

2. If the canister pressure is increased, a dilution factor (DF) is calculated and recorded on the sampling data sheet.

$$DF = \frac{Y_a}{X_a}$$

where:

X<sub>a</sub> = canister pressure (kPa, psia) absolute before dilution.  
 Y<sub>a</sub> = canister pressure (kPa, psia) absolute after dilution.

After sample analysis, detected VOC concentrations are multiplied by the dilution factor to determine concentration in the sampled air.

## 9.0 QUALITY ASSURANCE/ QUALITY CONTROL

The following general quality assurance procedures apply:

1. All data must be documented on standard chain of custody records, field data sheets, or site logbooks.
2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

## 10.0 DATA VALIDATION

This section is not applicable to this SOP.

## 11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, and corporate health and safety practices. Specifically, pressurizing of Summa canisters should be performed in a well ventilated room, or preferably under a fume hood. Care must be taken not to exceed 40 psi in the canisters. Canisters are under pressure, albeit only 20-30 psi, and should not be dented or punctured. They should be stored in a cool dry place and always be placed in their plastic shipping boxes during transport and storage.

## 12.0 REFERENCES

1. Ralph M. Riggan, Technical Assistance Document for Sampling and Analysis of Toxic Organic Compounds in Ambient Air, EPA-600/4-83-027 U. S. Environmental Protection Agency, Research Triangle Park, NC, 1983.
2. W. A. McClenny, J. D. Pleil, T. A. Lumpkin and K. D. Oliver, "Update on Canister-Based Samplers for VOCs," Proceedings of the 1987 EPA/APCA Symposium on Measurement of Toxic and Related Air Pollutants, May, 1987 APCA Publication VIP-8, EPA 600/9-87-010.
3. J. F. Walling, "The Utility of Distributed Air Volume Sets When Sampling Ambient Air Using Solid Adsorbents," Atmospheric Environ., 18:855-859, 1984.
4. J. F. Walling, J. E. Bumgarner, J. D. Driscoll, C. M. Morris, A. E. Riley, and L. H. Wright, "Apparent Reaction Products Desorbed From Tenax Used to Sample Ambient Air," Atmospheric Environ., 20:51-57, 1986.
5. Portable Instruments User's Manual for Monitoring VOC Sources, EPA-340/1-88-015, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Washington, D.C., June 1986.

6. R. A. Rasmussen and J. E. Lovelock, Atmospheric Measurements Using Canister Technology, *J. Geophys. Res.*, 83: 8369-8378, 1983.
7. R. A. Rasmussen and M. A. K. Khalil, "Atmospheric Halocarbon: Measurements and Analysis of Selected Trace Gases," *Proc. NATO ASI on Atmospheric Ozone*, BO: 209-231.
8. EPA Method TO-14 "Determination of Volatile Organic Compounds (VOC's) in Ambient Air Using Summa Passivated Canister Sampling and Gas Chromatographic Analysis", May 1988.

# APPENDIX A

## Volatile Organic Compound Data Sheet

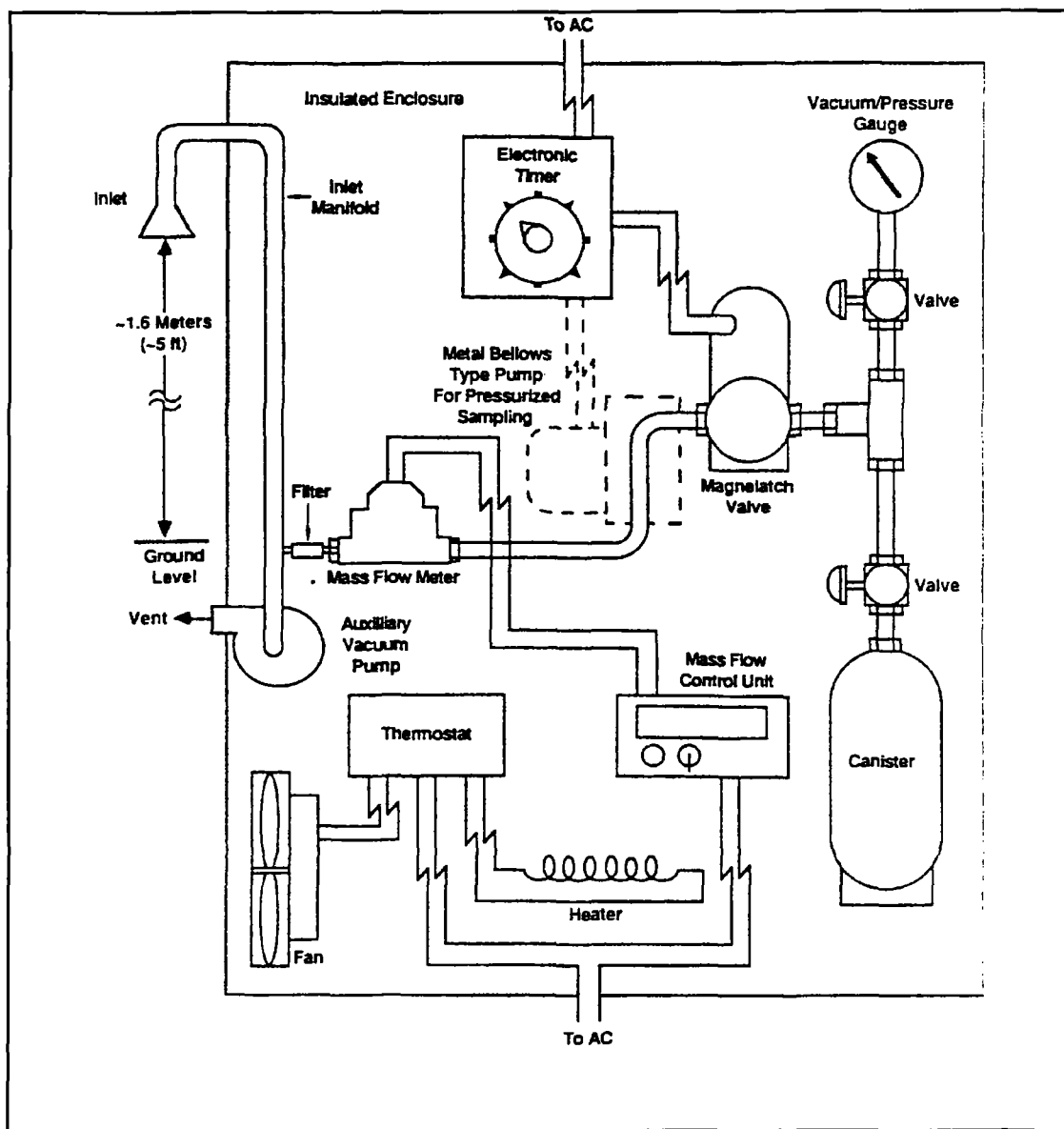
TABLE 1. VOLATILE ORGANIC COMPOUND DATA SHEET

COMPOUND (SYNONYM)	FORMULA	MOLECULAR WEIGHT	BOILING POINT (°C)	MELTING POINT (°C)	CAS NUMBER
Freon 12 (Dichlorodifluoromethane)	Cl <sub>2</sub> CF <sub>2</sub>	120.91	-29.8	-158.0	
Methyl chloride (Chloromethane)	CH <sub>3</sub> Cl	50.49	-24.2	-97.1	74-87-3
Freon 114 (1,2-Dichloro-1,1,2,2-tetrafluoroethane)	ClCF <sub>2</sub> CClF <sub>2</sub>	170.93	4.1	-94.0	
Vinyl chloride (Chloroethylene)	CH <sub>2</sub> =CHCl	62.50	-13.4	-1538.0	75-01-4
Methyl bromide (Bromomethane)	CH <sub>3</sub> Br	94.94	3.6	-93.6	74-83-9
Ethyl chloride (Chloroethane)	CH <sub>3</sub> CH <sub>2</sub> Cl	64.52	12.3	-136.4	75-00-3
Freon 11 (Trichlorofluoromethane)	CCl <sub>3</sub> F	137.38	23.7	-111.0	
Vinylidene chloride (1,1-Dichloroethene)	C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub>	96.95	31.7	-122.5	75-35-4
Dichloromethane (Methylene chloride)	CH <sub>2</sub> Cl <sub>2</sub>	84.94	39.8	-95.1	75-09-2
Freon 113 (1,1,2-Trichloro-1,2,2-trifluoroethane)	CF <sub>2</sub> ClCCl <sub>2</sub> F	187.38	47.7	-36.4	
1,1-Dichloroethane (Ethylidene chloride)	CH <sub>3</sub> CHCl <sub>2</sub>	98.96	57.3	-97.0	74-34-3
cis-1,2-Dichloroethylene	CHCl=CHCl	96.94	60.3	-80.5	
Chloroform (Trichloromethane)	CHCl <sub>3</sub>	119.38	61.7	-63.5	67-66-3
1,2-Dichloroethane (Ethylene dichloride)	ClCH <sub>2</sub> CH <sub>2</sub> Cl	98.96	83.5	-35.3	107-06-2
Methyl chloroform (1,1,1-Trichloroethane)	CH <sub>3</sub> CCl <sub>3</sub>	133.41	74.1	-30.4	71-55-6
Benzene (Cyclohexatriene)	C <sub>6</sub> H <sub>6</sub>	78.12	80.1	5.5	71-43-2
Carbon tetrachloride (tetrachloromethane)	CCl <sub>4</sub>	153.82	76.5	-23.0	56-23-6
1,2-Dichloropropane (Propylene dichloride)	CH <sub>3</sub> CHClCH <sub>2</sub> Cl	112.99	96.4	-100.4	78-87-5
Trichloroethylene (Trichloroethene)	ClCH=CCl <sub>2</sub>	131.29	87	-73.0	79-01-6
cis-1,3-Dichloropropene (cis-1,3-dichloropropylene)	CH <sub>3</sub> CCl=CHCl	110.97	76		
trans-1,3-Dichloropropene (cis-1,3-Dichloropropylene)	ClCH <sub>2</sub> CH=CHCl	110.97	112.0		
1,1,2-Trichloroethane (Vinyl trichloride)	CH <sub>2</sub> ClCHCl <sub>2</sub>	133.41	113.8	-36.5	79-00-5
Toluene (Methyl benzene)	C <sub>6</sub> H <sub>5</sub> CH <sub>3</sub>	92.15	110.6	-95.0	108-88-3
1,2-Dibromoethane (Ethylene dibromide)	BrCH <sub>2</sub> CH <sub>2</sub> Br	187.88	131.3	9.8	106-93-4
Tetrachloroethylene (Perchloroethylene)	Cl <sub>2</sub> C=CCl <sub>2</sub>	165.83	121.1	-19.0	127-18-4
Chlorobenzene (Phenyl chloride)	C <sub>6</sub> H <sub>5</sub> Cl	112.56	132.0	-45.6	108-90-7
Ethylbenzene	C <sub>6</sub> H <sub>5</sub> C <sub>2</sub> H <sub>5</sub>	106.17	136.2	-95.0	100-41-4
m-Xylene (1,3-Dimethylbenzene)	1,3-(CH <sub>3</sub> ) <sub>2</sub> C <sub>6</sub> H <sub>4</sub>	106.17	139.1	-47.9	
p-Xylene (1,4-Dimethylxylene)	1,4-(CH <sub>3</sub> ) <sub>2</sub> C <sub>6</sub> H <sub>4</sub>	106.17	138.3	13.3	
Styrene (Vinyl benzene)	C <sub>6</sub> H <sub>5</sub> CH=CH <sub>2</sub>	104.16	145.2	-30.6	100-42-5
1,1,2,2-Tetrachloroethane	CHCl <sub>2</sub> CHCl <sub>2</sub>	167.85	146.2	-36.0	79-34-5
o-Xylene (1,2-Dimethylbenzene)	1,2-(CH <sub>3</sub> ) <sub>2</sub> C <sub>6</sub> H <sub>4</sub>	106.17	144.4	-25.2	
1,3,5-Trimethylbenzene (Mesitylene)	1,3,5-(CH <sub>3</sub> ) <sub>3</sub> C <sub>6</sub> H <sub>3</sub>	120.20	164.7	-44.7	108-67-8
1,2,4-Trimethylbenzene (Pseudocumene)	1,2,4-(CH <sub>3</sub> ) <sub>3</sub> C <sub>6</sub> H <sub>3</sub>	120.20	169.3	-43.8	95-63-6
m-Dichlorobenzene (1,3-Dichlorobenzene)	1,3-Cl <sub>2</sub> C <sub>6</sub> H <sub>4</sub>	147.01	173.0	-24.7	541-73-1
Benzyl chloride (α-Chlorotoluene)	C <sub>6</sub> H <sub>5</sub> CH <sub>2</sub> Cl	126.59	179.3	-39.0	100-44-7
o-Dichlorobenzene (1,2-Dichlorobenzene)	1,2-Cl <sub>2</sub> C <sub>6</sub> H <sub>4</sub>	147.01	180.5	-17.0	95-50-1
p-Dichlorobenzene (1,4-Dichlorobenzene)	1,4-Cl <sub>2</sub> C <sub>6</sub> H <sub>4</sub>	147.01	174.0	53.1	106-46-7
1,2,4-Trichlorobenzene	1,2,4-Cl <sub>3</sub> C <sub>6</sub> H <sub>3</sub>	181.45	213.5	17.0	120-82-1
Hexachlorobutadiene (1,1,2,3,4,4-Hexachloro-1,3-butadiene)					



## APPENDIX B

FIGURE 1. Subatmospheric/Pressurized Sampling Equipment



## APPENDIX C

### Canister Sampling Field Data Sheet

Page \_\_\_\_ of \_\_\_\_

#### SUMMA AIR SAMPLING WORK SHEET

Site: \_\_\_\_\_  
 Samplers: \_\_\_\_\_  
 Date: \_\_\_\_\_

Site#: \_\_\_\_\_  
 Work Assignment Manager: \_\_\_\_\_  
 Project Leader: \_\_\_\_\_

Sample #					
Location					
SUMMA ID					
Orifice Used					
Analysis/Method					
Time (Start)					
Time (Stop)					
Total Time					
SUMMA WENT TO AMBIENT	YES/NO	YES/NO	YES/NO	YES/NO	YES/NO
Pressure Gauge					
Pressure Gauge					
Flow Rate (Pre)					
Flow Rate (Post)					
Flow Rate (Average)					
<div style="border: 1px solid black; padding: 5px;">                 MET Station On-site? Y / N             </div>					
General Comments:					

SUPERFUND TECHNICAL ASSESSMENT RESPONSE TEAM  
STANDARD OPERATING PROCEDURES

**SOP 806**  
**SUMMA CANISTER SAMPLING**

**1.0 SCOPE AND APPLICATION**

The purpose of this Standard Operating Procedure (SOP) is to describe a procedure for sampling of volatile organic compounds (VOCs) in ambient air. The samples are collected as whole air samples in passivated SUMMA stainless steel canisters. The VOCs are subsequently separated by gas chromatography (GC) and measured by mass-selective detector or multidetector techniques. This SOP describes procedures for sampling with canisters at final pressures both above atmospheric pressure (referred to as pressurized sampling) and below atmospheric pressure (referred to as subatmospheric pressure sampling).

This method is applicable to specific VOCs that have been tested and determined to be stable when stored in pressurized and subatmospheric pressure canisters. The organic compounds that have been successfully collected in pressurized canisters by this method are listed in Table 1, Volatile Organic Compound Data. These compounds have been measured at the parts per billion by volume (ppbv) level.

**2.0 METHOD SUMMARY**

Both pressurized and subatmospheric pressure sampling modes use an initially evacuated canister. Both modes may also use a mass flow controller/sample pump arrangement, fixed orifice, capillary, or adjustable micrometering valve to regulate flow. With this configuration, a sample of ambient air is drawn through a sampling train comprised of components that regulate the rate and duration of sampling into a pre-evacuated passivated SUMMA canister.

**3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE**

After the air sample is collected, the canister's valve is closed, an identification tag is attached to the canister, and the canister is transported to a laboratory for analysis. Upon receipt at the laboratory, the canister tag data are recorded. Sample holding and expiration times should be determined prior to initiating field activities.

**4.0 INTERFERENCES AND POTENTIAL PROBLEMS**

Contamination may occur in the sampling system if canisters are not properly cleaned before use. Additionally, all other sampling equipment (e.g., pump and flow controllers)

**Table 1: Volatile Organic Compound Data Sheet**

Compound Name (Synonym)	Formula	Molecular Weight	Boiling Point (°C)	Melting Point (°C)	CAS Number
Freon 12 (dichlorodifluoromethane)	$\text{Cl}_2\text{CF}_2$	120.91	-29.8	-158.0	-----
methyl chloride (chloromethane)	$\text{CH}_3\text{Cl}$	50.49	-24.2	-97.1	74-87-3
Freon 114 (1,2-dichloro-1,1,2,2-tetrafluoroethane)	$\text{ClCF}_2\text{CClF}_2$	170.93	4.1	-94.0	-----
vinyl chloride (chloroethylene)	$\text{CH}_2=\text{CHCl}$	62.50	-13.4	-1538.0	75-01-4
methyl bromide (bromomethane)	$\text{CH}_3\text{Br}$	94.94	3.6	-93.6	74-83-9
ethyl chloride (chloroethane)	$\text{CH}_3\text{CH}_2\text{Cl}$	64.52	12.3	-136.4	75-00-3
Freon 11 (trichlorofluoromethane)	$\text{CCl}_3\text{F}$	137.38	23.7	-111.0	-----
vinylidene chloride (1,1-dichloroethene)	$\text{C}_2\text{H}_2\text{Cl}_2$	96.95	31.7	-122.5	75-35-4
dichloromethane (methylene chloride)	$\text{CH}_2\text{Cl}_2$	84.94	39.8	-95.1	75-09-2
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	$\text{CF}_2\text{ClCCl}_2\text{F}$	187.38	47.7	-36.4	-----
1,1-dichloroethane (ethylidene chloride)	$\text{CH}_3\text{CHCl}_2$	98.96	57.3	-97.0	74-34-3
cis-1,2-dichloroethylene	$\text{CHCl}=\text{CHCl}$	96.94	60.3	-80.5	-----
chloroform (trichloromethane)	$\text{CHCl}_3$	119.38	61.7	-63.5	67-66-3
1,2-dichloroethane (ethylene dichloride)	$\text{ClCH}_2\text{CH}_2\text{Cl}$	98.96	83.5	-35.3	107-06-2
methyl chloroform (1,1,1-trichloroethane)	$\text{CH}_3\text{CCl}_3$	133.41	74.1	-30.4	71-55-6
benzene (cyclohexatriene)	$\text{C}_6\text{H}_6$	78.12	80.1	5.5	71-43-2
carbon tetrachloride (tetrachloromethane)	$\text{CCl}_4$	153.82	76.5	-23.0	56-23-5
1,2-dichloropropane (propylene dichloride)	$\text{CH}_3\text{CHClCH}_2\text{Cl}$	112.99	96.4	-100.4	78-87-5
trichloroethylene (trichloroethene)	$\text{ClCH}=\text{CCl}_2$	131.29	87.0	-73.0	79-01-6
cis-1,3-dichloropropene (cis-1,3-dichloropropylene)	$\text{ClCH}_2\text{CH}=\text{CHCl}$	110.97	76.0	-----	-----

should be thoroughly cleaned.

## 5.0 EQUIPMENT/APPARATUS

### 5.1 Subatmospheric Presssure Sampling Equipment

- VOC canister sampler - whole air sampler capable of filling an initially evacuated canister by action of the flow control from near 30 inches of mercury (Hg) vacuum to near atmospheric pressure (such as Andersen Samplers, Inc., NuTech, Scientific Instrumentation Specialist (SIS), or homemade subatmospheric canister samplers).
- sampling inlet line - stainless steel tubing to connect the sampler to the sample inlet.
- sample canister (6-liter size) - leak-free stainless steel pressure vessels of desired volume with valve and SUMMA passivated interior surfaces (SIS, Andersen Samplers, Inc., or equivalent).
- particulate matter filter - 2- $\mu$ m sintered stainless steel in-line filter (Nupro Co., Model SS-2F-K4-2, or equivalent).
- chromatographic-grade stainless steel tubing and fittings for interconnections – all materials in contact with sample, analyte, and support gases should be chromatographic-grade stainless steel.
- fixed orifice, capillary, or adjustable micrometering valve – used in lieu of the electronic flow controller/sample pump for grab samples or short duration time-integrated samples.

### 5.2 Pressurized Sampling Equipment

- VOC canister sampler – whole air sampler capable of filling an initially evacuated canister by action of the flow controller and pump from near 30 inches Hg vacuum to 15-20 psi atmospheric pressure (Andersen Samplers Inc., NuTech, SIS, or equivalent pressurized canister sampling system).
- mass flowmeter/controller – leak-free, linearly proportioned mass flowmeter/controller unit at desired flowrate (e.g., 100 mL/min). Although there may be other sources, a mass flowmeter/controller is available from Tylan, 15 Meadowview Ln, Medford, NJ 08055.

- sampling inlet line – stainless steel tubing to connect the sampler to the sample inlet.
- sample canister – leak-free stainless steel pressure vessels of desired volume with valve and SUMMA passivated interior surfaces (SIS, Andersen Samplers, Inc., or equivalent).
- particulate matter filter – 2- $\mu$ m sintered stainless steel in-line filter (Nupro Co., Model SS-2F-K4-2, or equivalent).
- chromatographic-grade stainless steel tubing and fittings for interconnections – all materials in contact with sample, analyte, and support gases should be chromatographic-grade stainless steel.

## 6.0 REAGENTS

This section is not applicable to this SOP.

## 7.0 PROCEDURES

### 7.1 Subatmospheric Pressure Sampling

1. Prior to sample collection, complete the appropriate information on the Air Sampling Data Sheet (Attachment 1).
2. Open a canister, which is evacuated to 28-30 inches Hg at sea level and fitted with a flow restricting device, to the atmosphere containing the VOCs to be sampled. The pressure differential causes the sample to flow into the canister. (Note: at higher elevations the vacuum may be less.) See Section 8.0 to calculate the flow rate.
3. This technique may be used to collect grab samples (duration of 10 to 30 seconds) or time-integrated samples (duration of 12 to 24 hours). Sampling duration depends on the degree to which the flow is restricted. The flow will remain constant until the vacuum reads approximately 11 inches Hg. When this occurs, control the flow, either manually or automatically, to achieve constant flow.
4. After sampling is complete, record the appropriate information on the Air Sampling Data Sheet.

### 7.2 Pressurized Sampling

1. Prior to sample collection, complete the appropriate information on the Air Sampling Data Sheet.
2. Use a digital time-programmer to preselect sample duration, and start and stop times.
3. Open a canister, which is evacuated to 28-30 inches Hg at sea level and connected in line with the sampler, to the atmosphere containing the VOCs to be sampled.
4. Using a direct drive blower motor assembly, draw a whole air sample into the system through a stainless steel inlet tube. (Some units do not have a blower).
5. Using a specially modified inert sample pump in conjunction with a flow controller, pull a small portion of this whole air sample from the inlet tube. The initially evacuated canister is filled by action of the flow controlled pump to a positive pressure not to exceed 25 psig.
6. Upon sampling completion at the location, complete the requisite information on the Air Sampling Data Sheet.

## 8.0 CALCULATIONS

A flow control device maintains a constant flow into the canister over the desired sample period. This flow rate is determined so that the canister is filled over the desired sampling period, to 2-5 inches Hg vacuum for subatmospheric pressure sampling or to about one atmosphere (15 psi) above ambient pressure for pressurized sampling.

1. For subatmospheric sampling, the volume of the sample must be calculated before the flow rate can be determined. The sample volume can be calculated by:

$$S = V - \left( \frac{V \cdot E}{I} \right)$$

where

S = sample volume (cm<sup>3</sup>)

V = volume of the canister (cm<sup>3</sup>)

I = initial canister vacuum (in. Hg)

E = estimated final vacuum (in. Hg)

For example, to calculate the sample volume of a 6-L canister with an initial canister vacuum of 28 inches Hg and an estimated final vacuum of 5 inches Hg.

$$S = 6000 - \left( \frac{6000 \cdot 5}{28} \right)$$

$$S = 4929 \text{ cm}^3$$

The flow rate can be calculated by:

$$F = \frac{S}{T(60)}$$

where:

F = flow rate (cm<sup>3</sup>/min or mL/min)

S = sample volume (cm<sup>3</sup>)

T = sample period (hours)

Using a 24-hour sampling period for the above sample volume, the flow rate can be calculated as:

$$F = \frac{4929}{24 \cdot 60}$$

$$F = 3.42 \text{ cm}^3/\text{min}$$

2. For pressurized sampling, only the flow rate has to be calculated.

For example, if a 6-L canister is to be filled with 12-L of sample at 2 atmospheres absolute pressure (near 30 psia) in 24 hours, the flow rate can be calculated by:

$$F = \frac{12000}{24 \cdot 60}$$



$$F = 8.3 \text{ cm}^3/\text{min}$$

3. If the canister pressure is increased for analysis, a dilution factor (DF) is calculated and recorded on the sampling data sheet.

$$DF = \frac{P_f}{P_i}$$

where:

$P_f$  = canister pressure (psig) after pressurization

$P_i$  = canister pressure (psig) before pressurization

After sample analysis, detected VOC concentrations are multiplied by the dilution factor to determine concentration in the sampled air.

## 9.0 QUALITY ASSURANCE/QUALITY CONTROL

The following general quality assurance procedures apply:

- All data must be documented on standard chain-of custody forms, field data sheets, or within site logbooks.
- All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

## 10.0 DATA VALIDATION

This section is not applicable to this SOP.

## 11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, and site-specific health and safety practices. More specifically, pressurizing of SUMMA canister should be performed in a well-ventilated room, or preferably under a fume hood. Care must be taken not to exceed 40 psig in the canisters. Canisters are under pressure, albeit only 20-30 psig, and should not be dented or punctured. They should be stored in a cool, dry place and always be placed in their plastic shipping boxes during transport and storage.

## 12.0 REFERENCE

EPA. 1991. Compendium of ERT Air Sampling Procedures. Office of Solid Waste and Emergency Response, Washington, DC. PB92-963-406.

Attachment: 1

**ATTACHMENT 1**  
**AIR SAMPLING DATA SHEET**

## Air Sampling Data Sheet

Date: \_\_\_\_\_

Sample ID No.: \_\_\_\_\_

Time: \_\_\_\_\_

Pump No.: \_\_\_\_\_

Site Name: \_\_\_\_\_

### Pump Type

☐ Dupont Alpha

☐ Gillian HFS-113

### Particulate Collection Devices

☐ 37 mm Polystyrene 3-piece Filter Cassette

☐ 25 mm Carbon filled black polypropylene w/cowl Filter Cassette

☐ 25mm Polystyrene 3-piece Filter Cassette

☐ Cyclone

☐ Cascade

### Particulate Collection Media

☐ Cellulose\*

☐ PVC (5.0 um)\*

☐ PTFE (5.0 um)\*

☐ MCE (.8 um)\*

☐ PTFE (.8 um)\*

☐ Glass Fiber (1.0 um)

☐ MCE (.45 um)\*

☐ PTFE (.45 um)\*

☐ VAC (.8 um)

☐ MCE (1.2 um)\*

☐ PTFE (.5 um)\*

☐ Silver membrane (.45 um)

☐ PVC (.8 um)\*

☐ PTFE (1.0 um)\*

☐ Silver membrane (.8 um)

☐ PVC (.45 um)\*

☐ PTFE (2.0 um)\*

\* Requires Support Pad

### Gas/Vapor Collection Devices

☐ Charcoal Sorbent Tube

☐ Tenax Sorbent Tube

☐ XAD Sorbent Tube

☐ Chromosorb Sorbent Tube

☐ Anasorb Sorbent Tube

☐ Silica Gel Sorbent Tube

☐ Porapak-T Sorbent Tube

☐ Hopcalite Sorbent Tube

☐ Tedlar Bag

☐ Cryogenic Trap

☐ Impinger

☐ PUF

### Calibration Data

	Run #1	Run #2	Run #3	Average	Pre-Post Avg.
Pre-Cal	1 pm	1pm	1pm	1pm	
Post-Cal	1pm	1pm	1pm	1pm	
Pre-post					1pm (V)

Sample Start Time: \_\_\_\_\_

Sample Stop Time: \_\_\_\_\_

Total Time Sampled: \_\_\_\_\_ minutes (Time)

### Volume Calculations

\_\_\_\_\_ (Time) x \_\_\_\_\_ (V) = \_\_\_\_\_ liters (VOLUME SAMPLED )

**Rauh, Jay**

---

**From:** Rauh, Jay  
**Sent:** Wednesday, December 12, 2007 10:25 AM  
**To:** Balla, Tonya  
**Subject:** New Tasks for Lane Street - HASP

Tonya,

December activities for Lane Street will include mobilizing to the site with OSC Theisen and placing summa canister samples in two residences. We have previously entered the residences. The only additional tasks not covered by the September HASP would be slick conditions outside of the houses and watching for household hazards (low ceilings, basements, etc) while placing the samples. Is this email sufficient to attach to the existing HASP to cover our activities for tomorrow and Friday?

Jay

12/12/2007

**FIGURE 1**  
**SITE LOCATION MAP**